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The need for systematic diagnosis of exercise-induced respiratory syndromes: the example of swimming-induced pulmonary edema

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Editorial

The performance in endurance sports (e.g. open-water swimming) is closely related to maximal oxygen uptake (VO_2max) and the ability to exercise at a high percentage of VO_2max [1], which in turn is the outcome of a fine cooperation among respiratory, cardiovascular and muscular system. The optimal performance of the muscular system is of paramount importance and, thus, is regularly evaluated during exercise testing sessions. The function of the cardiovascular system is a limiting factor of human performance in sports, too, as it is the physiological system providing O_2 to working muscles. Sports relying mostly on aerobic capacity (e.g. marathon running, road cycling, cross-country skiing, long distance swimming) stress the cardiovascular system.

Compared to the diagnosis of muscular and cardiovascular complications, relatively less information exists with regards to respiratory issues concerning endurance athletes [2]. Actually, incidence of exercise-induced respiratory problems such as swimming-induced pulmonary edema (SIPE), bronchoconstriction and/or asthma, vocal cord dysfunction, and arterial hypoxemia, all needing proper differential diagnosis has been observed in endurance athletes [2]. In this context, the present special issue covers an important gap of the existing literature and stimulates further research. We present the SIPE as an example of respiratory-pulmonary complication that needs systematic diagnosis. The pathophysiology of SIPE has not been fully studied, but it is related with the changes (pronounced in cold) in central vascular volume, redistribution of pulmonary blood flow and lung volumes due to immersion, which result in exposing regions of the capillary bed to high pressures that favour the extravasation of fluid by hydrostatic forces and potential stress failure of the capillaries [3]. Symptoms of SIPE include pronounced dyspnoea, cough, hypoxemia and profuse frothy haemoptysis [4]. The study of SIPE is of great practical value for the sports medicine team considering the increasing rates of participation during the last years in endurance events such as open-water swimming [5] and triathlon races in the cold [6].

In a recent review of the existing literature regarding SIPE [7], we concluded that this complication has a difficult diagnosis. Thus, it is necessary to consider the history and clinical presentation of the patient combined with the administration of diagnostic tests such as oxygen saturation, pulmonary function tests and radiological examination [8]. In the diagnosis of SIPE, we identified the key role of an immediate examination of signs and symptoms within the first two days of presentation.

Furthermore, the sports medicine team should be aware of the increased possibility of recurrent episodes.

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Declaration of Interests

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References

1. Baldassarre R, Bonifazi M, Zamparo P, et al. Characteristics and challenges of open-water swimming performance: a review. Int J Sports Physiol Perform. 2017. doi: 10.1123/ijspp.2017-0230

2. Carlsen KH, Anderson SD, Bjermer L, et al. Exercise-induced asthma, respiratory and allergic disorders in elite athletes: epidemiology, mechanisms and diagnosis: part I of the report from the Joint Task Force of the European Respiratory Society (ERS) and the European Academy of Allergy and Clinical Immunology (EAACI) in cooperation with GA2LEN. Allergy. 2008;63(4):387-403.

3. Lund KL, Mahon RT, Tanen DA, et al. Swimming-induced pulmonary edema. Ann Emerg Med. 2003;41(2):251-256.

4.Knutson T. Swimming-induced pulmonary oedema - a hazard in intensive military training? J R Army Med Corps. 2010;156(4):258-259.

5. Knechtle B, Nikolaidis PT, Rosemann T, et al. Performance trends in 3000 m open-water age group swimmers from 25 to 89 years competing in the FINA World Championships from 1992 to 2014. Res Sports Med. 2017;25(1):67-77.

6. Knechtle B, Nikolaidis PT, Stiefel M, et al. Performance and sex differences in 'Isklar Norseman Xtreme Triathlon'. Chin J Physiol. 2016;59(5):276-283.

7. Grunig H, Nikolaidis PT, Moon RE, et al. Diagnosis of swimming induced pulmonary edema – a review. Front Physiol. 2017. doi: 10.3389/fphys.2017.00652.

8. Adir Y, Shupak A, Gil A, et al. Swimming-induced pulmonary edema: clinical presentation and serial lung function. Chest. 2004;126(2):394-399.